

REMARKS

Claims 1, 4 and 5 have been amended. Claims 2 and 6 have been canceled. New claims 18-21 have been added. Thus, claims 1, 3-5 and 7-21 are presented for examination. Support for the claim amendments may be found in original claim 2, and in the specification, for example, at page 6, lines 16-20; page 6, lines 16-20; and page 20, lines 6-7. Support for new claims 18-21 may be found in the specification, for example, at page 5, line 20 to page 6, line 15; page 8, line 4 to page 17, line 8; page 5, line 20 to page 6, line 15; and page 20, lines 6-7.

With regard to new claim 19, both hydroxystyrene-based and (meth)acrylate-based resins comprising (a1), (a2), (a3) and (a4) described on page 8, line 4 to page 17, line 8 of the specification and resins for resist compositions used in the Examples do not disclose a structural unit which includes a carbon atom in an α -position to a hydroxyl group having at least one electron attractive group other than "the first structural unit which includes the carbon atom in the α -position to said hydroxyl group having at least one electron attractive group is bonded to the polymer terminal."

With regard to new claim 21, both hydroxystyrene-based and (meth)acrylate-based resins comprising (a1), (a2), (a3) and (a4) described on page 8, line 4 to page 17, line 8 of the specification and resins for resist compositions used in Examples do not disclose a substituent with a pKa value within the range of 6 to 12 other than "the substituents with a pKa value within the range of 6 to 12 bonded to the polymer terminal." Thus, no new matter has been added.

Rejection under 35 U.S.C. §102(b)

Claims 1-7, 11-13, 16 and 17 were rejected under 35 U.S.C. §102(b) as being anticipated by Przybilla et al. (*SPIE*, Vol. 1672, Advances in Resist Technology and Processing).

Claim 1 as amended recites a resin for photoresist composition having a first structural unit that comprises a hydroxyl group bonded to a carbon atom, wherein the first structural unit comprises a $-CR^1R^2OH$ group, and in which the R^1 and R^2 groups are as recited in the claim, wherein the $-CR^1R^2OH$ group is located at a polymer terminal of the resin. The claimed $-CR^1R^2OH$ structure does not read on the 2-hydroxyhexafluoroisopropyl (HHFIP) group disclosed by Przybilla et al.

Furthermore, the claimed content (amount) of the "first structural unit" in new claims 18 and 20 is also different from that disclosed by Przybilla et al. Przybilla et al. discloses that in

order to attain the appropriate alkaline solubility as a resin for a chemical amplification photoresist, the polymers comprising the resin for a chemical amplification photoresist require 30 to 40 mol% of 2-hydroxyhexafluoroisopropyl (2-HHIFIP) groups in the polymer. (page 501, paragraph 2.1) However, the present specification recites at page 5, lines 20-25 that:

in this resin for a photoresist composition, the proportion of structural units (M1) that include the aforementioned $-\text{CR}^1\text{R}^2\text{OH}$ group bonded to a polymer terminal (hereafter, this group may also be referred to as the "terminal structure") is preferably at least 1 mol% (and preferably 2 mol% or higher) relative to the combined 100 mol% of all the structural units other than the structural units (M1) within the photoresist composition resin (resin for photoresist composition)

and also recites at page 6, lines 5-15 that:

there are no particular restrictions on the upper limit for the above proportion, although considering practical factors such as the production method, the value is typically no more than 5 mol%. Furthermore, depending on the nature of the composition, if the proportion of the above terminal structures is too high, then undesirable phenomena such as thickness loss in the resist pattern, and slight tapering at the base of the patterns may occur. The number of mols of the structural unit (M1) is, of course, equal to the number of mols of the terminal structure, and the number of mols of hydroxyl groups. By ensuring that the proportion is at least 1 mol%, a superior LER improvement effect can be realized as a result of the introduction of the terminal structure. If the proportion is less than 1 mol%, then there is a tendency for this effect to deteriorate.

Thus, Przybilla et al. neither teach nor suggest that the proportion of first structural units is 1-5 mol% as recited in new claims 18 and 20, and if fact teaches a content of 30-40 mol% of the first structural unit, which is 6 to 8-fold higher than the highest amount recited in claims 18 and 20. Applicants have added the feature recited in claim 1, and added new claims 18 to 21, in order to further distinguish claim 1 over Przybilla et al. Since claims 2 -4, 6, 7, 11-13, 16 and 17 depend on claim 1, either directly or indirectly, they are also not anticipated (or rendered obvious) by Przybilla et al.

In view of the amendments and comments presented above, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. 102(b).

Rejection under 35 U.S.C. 102(b)/103(a)

Claims 1-3, 5-13, 16 and 17 were rejected under 35 U.S.C. §102(b) as being anticipated by, or, in the alternative, under 35 U.S.C. §103(a), as being obvious over Pawlowski et al. (U.S. 6,358,665). The feature added to claim 1 is discussed above. The claimed $-\text{CR}^1\text{R}^2\text{OH}$ structure

does not read on the 2-hydroxyhexafluoropropyl groups disclosed by Pawlowski et al., nor is the claimed structure suggested by this reference. Moreover, Pawlowski et al. (and Przybilla et al.) merely teach that a hydroxyl group in a polymer is an alkali soluble group and is protected by an alkali dissolution inhibiting group and changes from being alkali insoluble to alkali soluble by the cleavage of the protected alkali soluble group under the action of acid generated by an acid generator.

Moreover, the structures of the resins for photoresist compositions recited in the present claims play an unexpected role in improvement of the LER characteristics, improvement of the resolution by reduction in resist pattern collapse, improvement of the depth of focus characteristic and decrease of the level of defects. In addition, the electron attractive group in claim 1 allows the hydrogen atom of the hydroxyl group to readily dissociate, thereby imparting a suitable degree of acidity to the resin, and consequently improving the solubility of the resin in the alkali developing solution, and improving the LER characteristics at the interface between the exposed portions and the unexposed portions of the resist pattern. (see page 18, line 15 to page 19, line 4 of the specification). These unexpected advantages of the resulting resins would effectively rebut any *prima facie* case of obviousness if one were present. Since claims 2, 3, 6-13, 16 and 17 depend on claim 1, either directly or indirectly, they are also not anticipated (or rendered obvious) by Pawlowski et al.

In view of the amendments and comments presented above, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §102(b)/103(a).

Rejection under 35 U.S.C. §103(a)

Claims 14 and 15 were rejected under 35 U.S.C. §103(a) as being unpatentable over Pawlowski et al. in view of Lamanna et al. (U.S. 5,554,664). Claims 14 and 15 indirectly depend on claim 1. As described above, Pawlowski et al. neither disclose nor suggest the language recited in amended claim 1. Lamanna et al. teaches that a compound comprising an imide anion is used as a polymerization initiator activated by energy (e.g. thermal, radiation or photosensitive), which does not remedy the defect in the teaching of Pawlowski et al. Because this claim element is missing from both references, claims 14 and 15 cannot be obvious in view of this combination of references.

In view of the amendments and comments presented above, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a)

CONCLUSION

Applicants submit that all claims are in condition for allowance. However, if minor matters remain, the Examiner is invited to contact the undersigned at the telephone number provided below.

Respectfully submitted,

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Dated: 8/24/07

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